UNIVERSITI PUTRA MALAYSIA

GROWTH AND YIELD PERFORMANCE OF *Capsicum annuum* USING SEVERAL SOILLESS MEDIA COMBINATIONS

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FP 2015 93

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A project report submitted to Faculty of Agriculture, Universiti Putra Malaysia, in fulfilment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science

Faculty of Agriculture

Universiti Putra Malaysia

2014/2015

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2014/2015

ACKNOWLEDGEMENT

First of all, thanks to God Almighty for His grace and for giving me the opportunity to finish my project. I wish to express my deepest appreciation to my project supervisor, Prof. Dr.Thohirah Lee Abdullah for her invaluable guidance, patience, suggestion, encouragement and constructive criticisms during the entire project.

I am indebted to staff Field 2 for their advice and kind assistance throughout the entire study. Also, not forgetting to all staff Faculty of Agriculture especially to Encik Yusof and Tuan Haji Khoiri for their help and guidance during work in the lab and site project.

I would like to thank to Mrs Sarah, Miss Suraya, Mr.Wong and Mr.Chen also to all my friends especially Aqilah, Fadlun, Hafizah, and Huda for their helps and support which contributed towards the success of this project.

Finally, I dedicate this project paper to my parents and siblings for their encouragement, patience and sacrifice during these four years of study in the university.

This project report entitled Growth And Yield Performance Of *Capsicum annuum* Using Several Soilless Media Combinations is prepared by Nur Haziqah bt Muhamad Hatta and submitted to the Faculty of Agriculture in fulfilment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agriculture Science.

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ABSTRACT

In Malaysia, more than 2 million tons of agricultural wastes are produces annually. Agricultural waste or residue is made up of organic compounds from organic sources such as rice straw, oil palm empty fruit bunch, sugar cane bagasse, coconut shell and others. All of these wastes are increasing each year leading to disposal problems. Improper management of agricultural waste can cause damage to the land and environment. The objectives of this experiment were to determine the growth and yield performance of *Capsicum annuum* using several soilless media combination and to select the best formulations of soilless media on the growth of *Capsicum annuum*. The EFB compost was used with combination of other additives such as EFB biochar (EBC) and rice husk biochar (RHB) with different ratio. The treatments used for T1 as a control with 100% empty fruit bunch (EFB) compost, T2 (90% EFB compost + 10% EBC), T3 (90% EFB compost + 10% RHB), T4 (70% EFB compost + 30% EBC) and T5 (70% EFB compost + 30% RHB). The result showed that a mixture of 100% EFB compost promoted the lowest growth performances of chilli whereas a mixture of 70% EFB compost and 30% biochar promoted the highest performance of plant growth. The mean height showed significant difference after seventh week while leaf number showed significant difference after fifth week of cultivation. Application of media amended with biochar has significant effects on improved plant growth, increase yield and earlier days to flowering on chillies. Nutrients content of foliar, pH and nutrients in planting medium were also increased . This study indicated that biochar amendment in planting medium showed the most suitable treatment to produce the best growth performance and yield of chillies (268gm/plant).

ABSTRAK

Di Malaysia, lebih daripada 2 juta tan sisa pertanian telah dihasilkan pada setiap tahun. Siasa pertanian ini terdiri daripada bahan organik iaitu daripada sumber seperti jerami padi, tandan kosong kelapa sawit, hampas tebu dan tempurung kelapa. Kesemua sisa buangan ini semakin meningkat setiap tahun yang membawa kepada masalah pelupusan bahan buangan. Pengurusan sisa bahan pertanian yang kurang efisien akan mendatangkan kesan kepada tanah dan alam sekitar. Tujuan kajian ini dijalankan adalah untuk mengkaji kesan penggunaan media tanpa tanah terhadap tumbesaran dan hasil cili menggunakan kadar media yang berbeza dan untuk mengenal pasti kadar campuran formulasi media yang terbaik. Kompos tandan kelapa sawit kosong (EFB) digunakan dengan kombinasi bahan tambahan EFB biochar dan sekam padi biochar pada kadar berbeza. Media yang digunakan bagi T1 100% tandan kelapa sawit kosong (EFB), T2 (90% EFB kompos + 10% EFB biochar), T3 (90% EFB kompos + sekam padi biochar), T4 (70% EFB kompos + 30% EFB biochar) dan T5 (70% EFB kompos + sekam padi biochar). Kajian menunjukkan campuran 100% EFB kompos menghasilkan pertumbuhan pokok cili yang paling rendah manakala campuran 70% EFB kompos dan 30% sekam padi biochar pula menghasilkan pertumbuhan yang paling tinggi. Purata ketinggian pokok menunjukkan perbezaan pada minggu ketujuh manakala purata bilangan daun menunjukkan perbezaan pada minggu kelima. Penggunaan media yang ditambah dengan biochar mempunyai kesan ketara dalam menggalakkan pertumbuham pokok, meningkatkan hasil, dan mengurangkan masa pendebungaan. Selain itu, ia juga mempengaruhi kesan nutrien daun, pH dan nutrien dalam media penanaman. Eksperimen ini menunjukkan penggunaan biochar dalam media penanaman sesuai dalam menghasilkan pertumbuhan pokok dan hasil yang tinggi (268gm/ pokok).

CHAPTER 1

INTRODUCTION

The cultivation of plants in media other than natural soil is not a new technique. The horticulture industry is one of the primary consumers of organic amendments for use its growing media. According Gouin (1995), for just nurseries and greenhouses, nearly 80% of ornamental plants are marketed in containers and 75 to 80% of the ingredients in potting media consist of organic materials. In recent years, environmental and economic concerns have caused growers to seek alternatives to peat, and compost has been frequently considered as a substitute for peat in the media used to produce potted plants (Jayasinghe , 2012).

The purpose of using planting media is use to enhance the soil supply of the elements needed by the plants. Also, it is to discover more exactly the basic requirements of the minerals by plants.

Nowadays, an increasing number of world's population and also the improvement in the standard of living have made a strong demand for high value of foods and high quality produce. Hence, technique such as increase in soilless production is use relative to total agricultural crop production.

Soilless culture is a cultivation technique by which plants are grown detached from the soil. Plants are cultivated in containers filled with several possible growing media. These growing media can be either yard waste and manure compost. Examples of growing media that had been used such as empty fruit bunch (EFB)

compost, bio char, rice husk, and coco peat. Each of these media has their own physical and chemical properties. Also, they have different nutrient content which contribute to the growth of the plant.

Recently, many studied had been done shows that the organic residues, including livestock solid waste, sewage sludge and green plant residue which after proper composting can be used with very desirable results as growth media (Piamonti *et al*., 1997, Garcia-Gomez *et al*., 2002). Also, Chinese records dating back more than 2000 years report the use of organic manures in agriculture (Beaton, 2009).

The main reasons for the extension of crops grown on substrates have been to avoid soil borne diseases and for the good agronomic performances of the crops with these systems. Also, the advantages include light weight substrates and lack of pests that are commonly found in soil.

The organic amendments, such as traditional thermophilic composts, have been used to increase crop productivity and yields (Bwamiki et al., 1998). With that, their use is usually associated with improved soil structure and enhanced soil fertility (Follet et al., 1981), increased soil microbial populations (Barakan et al., 1995) and activity (Zink and Allen, 1998). Also, this organic amendments can improved moisture-holding capacity of the soil.

Substrates are been used due to their manufacturing processes since they are essentially free of pests and diseases. Also in reuse from crop to crop, these materials

can be disinfested between uses so as to kill any microorganisms. The continuing shift to soilless cultivation is also driven by the fact that in soilless system it is possible to have better control over several crucial factors, leading to greatly improved plant performance (Raviv and Lieth, 2008).

Chilli or *Capsicum annuum* is classified as a fruit vegetable that is highly demanded by locally and internationally. In Malaysia, chilli is the among top ranking grown by Malaysian Vegetables farmers due to high demand and stable price. Study shows that the local chilli production in 2012 around 29.834 tan. However, local production is still insufficient to meet local demand because chilli production hampered by inferior varieties and susceptibility to pests and diseases. Hence, chilli has to be imported to supplement local production.

OBJECTIVES

1) To study the growth and yield performance of *Capsicum annuum* using several soilless media combination.
2) To determine the best formulations of soilless media on the growth of *Capsicum annuum.*

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